1.2 continued

The **Factor Theorem** states a polynomial $P(x)$ has $x-a$ as a factor if and only if $P(a)$ or remainder is zero.

ex.1 Is $x-1$ a factor of $x^4-3x^3+2x^2-x+1$?

$x-1=0$
$x=1$

$P(1) = (1)^4-3(1)^3+2(1)^2-1+1=0$

Yes it is since $R=0$

ex.2 Factor $P(x)=x^3-6x^2+11x-6$

x^3: max of 3 factors (highest power)

$\pm1, \pm2, \pm3, \pm6$ possible factors

R.T. → $P(1)=1-6+11-6=0$ means it is a factor

→ $x=1$ → $x-1$ factor

synthetic division

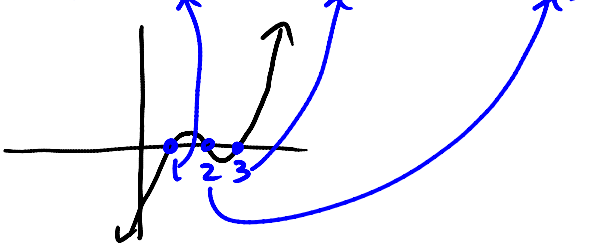
1	1	−6	11	−6
	↓	1	−5	6
	1	−5	6	0 = R

x^2-5x+6 ⊕ −5, ⊗ 6

$(x-3)(x-2)$

FACTORS $=(x-1)(x-3)(x-2)$

graph. calc.



ex 3. $3x^3-4x^2-5x+2$

max of 3 factors

because of the leading coefficient one

because of the leading coefficient one of the factors has the form $ax-b$ $\left(x=\frac{b}{a}\right)$

$x=\frac{b}{a}$ factors of constant / factors of coeff. of highest power.

$\frac{b}{a}$ $\frac{\pm1,\pm2}{\pm1,\pm3}=\pm1,\pm\frac{1}{3},\pm2,\pm\frac{2}{3}$

easiest to begin with integers

$P(-1)=0$ $x=-1$

$(x+1)$ is a factor

-1	3	-4	-5	2
		-3	7	-2
	3	-7	2	0 = R

$3x^2-7x+2$ $\oplus -7$ $\circledast 6$ $-1,-6$

$(x-\frac{1}{3})(x-\frac{6}{3})$

$(x+1)(3x-1)(x-2)$ FACTORS

p22 # 9, 11, 12, 14, 15